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AUTHOR Gutierrez, Carlos G.; Brown, Costello L.
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ABSTRACT

The Biomedical Sciences Program at California State University, Los Angeles (CSULA), is described. The federally funded program was designed to help economically disadvantaged students to pursue careers in biomedical sciences. The program provided academic support in mathematics, science, and English; study skills development; experiences in laboratory and health care delivery settings; and exposure to biomedical science professionals. At CSULA the program was designed to serve 100 secondary school students, initially all in the ninth grade. Characteristics of the target high schools included: 86 percent of the student population was Hispanic, and many lacked basic writing skills and specialized vocabularies. Information is provided on: selection of student participants; the academic year program (biomedical science modules, mathematics tutorials, and communication skills tutorials); three summer programs (1981-1983); academic/career counseling; a psychology component (i.e., emotional growth); the college admissions process; involvement of the parents in the program; and program termination. Program results are described, with attention to retention rates in the program and in high school, achievements of Hispanic students in their high schools, and performance on the Pre-Scholastic Aptitude Test and the Scholastic Aptitude Test. (SW)

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THE CALIFORNIA STATE UNIVERSITY, LOS ANGELES BIOMEDICAL SCIENCES PROGRAM

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Carlos G. Gutierrez, Ph.D.
and
Costello L. Brown, Ph.D.
Co-directors

Biomedical Sciences Program
Department of Chemistry and Biochemistry
California State University
Los Angeles, California 90032

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On November 1, 1978, Congress passed Public Law 95-561 as an amendment to Title III of the Elementary and Secondary Education Act of 1965. Part L of bill, Biomedical Sciences sought to:

"(1) introduce secondary students from an economically disadvantaged background to the challenges, opportunities, and needs of serving in communities which have a need for professionals trained in the biomedical sciences and which have an under-representation of individuals from such a disadvantaged background serving as medical professionals;

(2) motivate and educate these students to successfully pursue careers in the biomedical sciences;

(3) develop academic, cognitive, and communicative skills in these students;

(4) rectify disadvantages resulting from foreign language barriers; and

(5) instill awareness and concern in these students for the health of their families and communities;

by offering these students an intensive academic program in mathematics, the sciences, and English, study skill development, experiences in laboratory and health care delivery settings, and frequent exposure to individuals trained, or receiving training, in the biomedical sciences."

In May 1980, the U.S. Department of Education solicited proposals from institutions of higher education to develop projects to accomplish the goals of this bill.

California State University, Los Angeles, submitted a proposal. It was one of 12 projects funded nationwide.

I. Introduction - The University

California State University, Los Angeles (CSULA) is located in East Los Angeles, a section of metropolitan Los Angeles. The University, which currently enrolls more than 24,000 students, primarily serves residents of eastern, north-eastern, central and south-central sections of the city of Los Angeles. There is no university that is in such close proximity to the largest and densest population of minority and low income residents in California. If one looks at the total population of minorities in Los Angeles County, over two-thirds of the total 800,000 Black population and 49% of the total 1.5 million Hispanics (more than 90% are Mexican-American) are in the primary service area of Cal State L.A. In addition, 38% of the 25,000 Native Americans in Los Angeles County live in this same service area.

The University itself reflects its service area population with an unusually high number of minority and disadvantaged students enrolled. The institution has more than 7,400 Black, Mexican-American, Native American, Puerto Rican/Hispanic, and 5,200 economically disadvantaged (non-minority) students enrolled. It also has 3,400 students of Chinese, Filipino, Japanese, Korean and other Asian origins. Thus, in absolute numbers few institutions in the continental United States have either more Black or Mexican-American students, and only the University of Hawaii has a larger enrollment of Asian students.

The University has considerable experience in the training of minority biomedical scientists. The university science faculty who participated in the Biomedical Sciences Program has a great deal of prior experience in working with disadvantaged students. All of the participating faculty have had Minority Biomedical Research (MBS) grants from the National Institutes of Health for several years and have worked directly with minority students, most of whom would also qualify as disadvantaged under this program's definition. We have also had an NSF-SST program where disadvantaged junior and senior high school students have worked in research laboratories with some of the participating faculty, who had also worked with the mentally gifted minors (MGM) program (mostly 6th and 7th graders). Thus, at the onset, the participating science faculty already possessed the sensitivity, the necessary experience, and an understanding of disadvantaged students which could not possibly be duplicated by the science faculty of any other institution of higher learning in the State of California.

It would be difficult for any institution of the caliber and size of CSULA to provide a better role model for this program than that of the current President of this University, Dr. James Rosser, who is Black and has a Ph.D. in Health Service Administration.

II. The CSULA Biomedical Sciences Program

A. Program Development

The Biomedical Sciences Program at CSULA was unique in several respects. First, the program involved seven full-time university faculty members possessing Ph.D.'s in their respective areas of science, and all of whom themselves are directly involved in biomedical research (with on-going research programs) and the training of future biomedical scientists. Four of these seven faculty members are ethnic minorities, including the co-directors (Black and Hispanic) and two of the five science area coordinators (Black and Asian). Three of the five faculty area coordinators are women.

Use of this personnel eliminated, perhaps, what would be one of the difficult aspects of this type of program at most universities: The coordination and involvement with the science departments and especially those individual science faculty members actively involved in biomedical research.

The program design was developed by the co-directors and science area coordinators after consultations and discussions with the principals and science teachers at the eleven high schools that participated in the program.

The CSULA Biomedical Sciences Program was designed to serve 100 secondary school students, initially all in the ninth grade. These students, while economically disadvantaged, had shown potential for success in post-secondary education, leading to a career in a biomedical science. The purpose of the CSULA Biomedical Sciences Program was to provide the vehicle by which these participants would develop into confident, mature students; able to compete successfully for admission to colleges and universities, and to continue their studies in the biomedical sciences leading to careers in these areas.

B. The Service Population

The federal interpretation of "economically disadvantaged" which defined the student population to be served by this Program was quite restrictive: individuals from households earning 50% or less than the 1979 national median income, adjusted (slightly) for family size. The range of maximum allowed family incomes ran from $8,000 - $12,000 per year, depending on family size. In Los Angeles, where the cost of living is particularly high, this limited access to this program to only the lowest stratum of the city's lower economic classes.

We selected eleven secondary schools in our service area which enrolled large numbers of economically disadvantaged students (all designated as Title I eligible schools). A list of these schools and their student body racial-ethnic composition is given in Table I. These schools are in the Eastern, Central and South-Central parts of the City.

A profile of one of the target high schools helps put the service area into perspective. When we first visited Huntington Park High School in the Fall of 1979, it enrolled 2235 students (see Table I for detailed racial breakdown of student body).

Hispanics make up 86% of the student population. In 1978, the eleventh grade class tested low on the Comprehensive Test of Basic Skills: 83.7% were at or below the national 50th percentile and 60.0% were at or below the 24th percentile. However, a poll of 500 students at this predominantly Hispanic school indicated that 76% had a desire for college or university training. College bound students must be reading at or above the 50th percentile if they are to successfully complete their college or university education.

Paucity of skills in the English language, lack of breadth and depth of knowledge, and deprived vocabularies appear to be the prime reasons for the discrepancy between students' performance and desires. Secondary reasons may be attributed to lack of expectation on the part of both the teacher and the student in achievement of learning goals that lead to college-competitive levels of English in all subject matter areas. The minimum amount of individualization of learning activities and somewhat depersonalized learning atmosphere at most of the target secondary schools also seem to account for part of the discrepancy. Science and mathematics faculty members who participated in this analysis were quick to point out that the lack of specialized vocabulary and basic writing skills is a major problem in these specific subject matter areas.

Interviews with 35 student leaders provided the greatest insight into the problems of the Hispanic college bound student. Of this group, 95% were planning college/university enrollment if financial aid were available (however, none indicated knowledge of financial aid resources available, nor the achievement levels required for eligibility for this aid). All of the 12th grade students who had seen a college advisor stated that the first contact was in the senior year. Typical counselor to student ratios are 1:450. Eighty-percent indicated that they had no direct access to typewriters, encyclopedias, large dictionaries, or thesauri in their homes. Seventy-five percent indicated that they were not aware of college admission requirements. All indicated that their teachers were understanding, but felt they should be more demanding. While teachers like the students, they seem unwilling to require high quality competitive work from them. They seem unsure of how to demand, or even whether they could demand, competitive quality college preparatory work from students who utilize Spanish, not English, as their primary language.

Taking 203 English sentences that were written in college preparatory composition classes, English and Spanish teachers analyzed the errors: 37% of all errors resulted from linguistic

logic that reflected the use of Spanish sentence structures; 60% of all spelling errors were a result of Spanish phonetic structures; all sentences reflected the effect of limited utilization of English as written language; all sentences showed a diminished English vocabulary utilization. Not surprisingly, the 1978 mean for Huntington Park students on the verbal part of the Scholastic Aptitude Test was 337. The national verbal mean score was 429.

The general conditions have not significantly improved since the time of this survey. By 1984, the school population had surged to 3600, necessitating year-round, double shift operation. Huntington Park students scored in the lowest one percentile in reading, writing, and mathematics on the California Assessment Program. To illustrate the generality of the problem, every school listed in Table I (except Cathedral and St. Michael's) was admonished in 1984 by the California State Assembly Education Committee as being among the worst in the state: students scored in the lowest twenty-fifth percentile on state tests in all subjects for the past three years. Cathedral and St. Michael's are parochial high schools and were not reviewed by the Education Committee.

C. Student Participant Selection

On September 1, 1980, we were informed about the approval and funding of the California State University Los Angeles Biomedical Sciences Program (CSULA-BSP). We set out to select our cohort of 100 ninth grade participants. Los Angeles Unified School District high schools generally do not include the ninth grade. Consequently, we tapped the junior high schools which are feeders to the high schools listed in Table I.

During the Fall of 1980, we visited twenty-seven junior high schools and delivered 1,000 applications for admission to the CSULA-BSP. Working with science teachers, gifted-student coordinators, and community leaders, we requested submissions from students with a demonstrated or potential aptitude for success, and interest in the biomedical sciences. We received 600 applications; interviewed 400 applicants; and selected 100.

Selection was based on letters of recommendation, academic accomplishment, interest in science and meeting the stringent Federally-imposed economic criteria. Although the applicants could not be classified economically as middle class, almost all with top academic accomplishment came from households having incomes greater than the maximum $8,000 - $12,000 (the highest per annum income reported on an application was $24,000 for a family of 10). The top third of the applicant pool was lost to

the Program in this way. It was revealing to us to see such a strong correlation between family income and academic performance.

The 100 students selected for participation were intelligent and talented, but generally without the tradition or habit of exceptional academic success. Of this group, 40 were Hispanic.

D. The Training Program

The training was performed on the campus of California State University, Los Angeles. Classroom, laboratory and lecture hall facilities were reserved. The academic departments of Chemistry, Biology and Microbiology hosted the CSULA-Biomedical Sciences Program because of their biomedical orientation. We sought to acquaint the student participants (and their parents) with the collegiate/university environment as soon as possible. Familiarity with the university environment, we feel, will have a positive impact on their subsequent desire for college/university training.

1. Academic Year Program

The overall purpose of the proposed Biomedical Sciences Program was to increase the number of economically disadvantaged students who eventually become medical professionals and biomedical scientists. In order to do this, we initiated an educational and motivational program to remove deficiencies and at the same time provide the necessary motivation. During the first year of the program, our basic objectives were to introduce or orient the participating students to the university; provide an intensive, yet interesting, academic program in English, math, and the sciences (biology, chemistry and microbiology). This academic component was supported and enhanced by related activities, including field trips, demonstrations, seminars and interaction with appropriate role models within the biomedical sciences.

The academic year programs consisted of a Saturday morning Biomedical Science Academy. The Saturday format was chosen after consultation with secondary school staffs including principals, teachers and counselors as being most advantageous to the participating students. Such a format would eliminate time conflicts between the CSULA-Biomedical Sciences Program and secondary school-related extra curricular activities, such as sports, student government, and organizations. The Saturday morning program consisted of 30 four-hour sessions (total: 120 activity hours).

Beginning in the Fall, the 100 participant students were brought to the CSULA campus on 10 consecutive Saturdays (corresponding to the CSULA Fall Quarter), 10 during the winter (corresponding to the CSULA Winter Quarter), and 10 in the spring (corresponding to the CSULA Spring Quarter).

To efficiently use the facilities and to create a more personalized atmosphere for the Biomedical Sciences Program, the original group of 100 student participants were divided into five groups of 20. These small groups each reflected the ethnic/racial and gender mix of the original. It is in these groups of 20 that the students participated in all program academic activities.

All student in their 20-member groups participated in a Mathematics Tutorial, Communication Skills Tutorial, and three Biomedical Science Modules. The Mathematics Tutorial was held one hour each Saturday throughout the 30 weeks of the program. The Communication Skills Tutorial (English) was done in a similar manner. The Biomedical Science Modules were each covered in 10-week periods (corresponding to one academic quarter; roughly two hours per meeting) in each of the following three disciplines: biology, chemistry and microbiology/public health. Although we originally designed this project as an enrichment program, the fact that Los Angeles Unified School District offers no science in the ninth grade, the CSULA Biomedical Science Program became the only source of science instruction for the participants that first year.

The various groups (numbers 1 through 5 in the following table) of 20 students were rotated through the three Biomedical Science Modules as shown on the next page, so that at the end of the academic year all students participated in all three:

Area Modules	Fall Quarter Groups	Winter Quarter Groups	Spring Quarter Groups
Chemistry	1,2	5	3,4
Biology	3,4	1,2	5
Microbiology	5	3,4	1,2

The course work/laboratory format of each biomedical science area was augmented by three field trips during the academic year. In addition, a series of three seminars were presented during the course of the academic year by

prominent biomedical scientists and health professionals (with emphasis on positive role models, which are discussed later).

The schedule for a typical Saturday morning is given below:

8:30 - 9:30	Mathematics Tutorial
9:30 - 10:30	Communication Skills Tutorial
10:30 - 12:30	Biomedical Science Module

When a seminar was scheduled, it was one hour long and replaced either the Mathematics or Communication Skills Tutorial that day.

When a field trip was scheduled, it lasted the entire four-hour period.

The various components of the academic year program (The Biomedical Science Modules, the Mathematics Tutorial and the Communication Skills Tutorial) need to be examined in greater detail.

a. Biomedical Science Modules

Three 10-week biomedical science modules were presented each academic year. The general areas were chemistry, biology and microbiology/public health. The purpose of the modules were manifold. They (1) broadened the student's general scientific knowledge; (2) provided the student with the specialized vocabularies of the various disciplines; and (3) pointed out the wide variety of career options within the biomedical sciences.

The material presented in the modules was increased in scope and depth each succeeding year. The material was geared to the student's grade level and provided a good academic challenge. The modules were of the lecture/laboratory format with an emphasis on hands-on (participatory) experience for the students. Each group of 20 students was led by an instructor and two assistants. Both the instructor and the assistants were under the direct supervision of the specific faculty area coordinators.

We used talented Hispanic, Black and Asian high school teachers, CSULA graduate students, and faculty as the teaching staff. Minority undergraduates were used as assistants and tutors. These undergraduates often had

graduated from the same high schools as the participating students attended. This role modeling at a variety of levels, from program director to coordinator to teacher to assistant was of great psychological benefit, we feel, to the student participants.

A listing of the topics/experiments covered in the three-year period by the biology component is illustrative activities done in this component.

Biology (Developed by Dr. Margaret Jefferson and Dr. Betsy Peitz, Associate Professors of Biology, CSULA).

First Year: Science Motivation and Awareness Theme

1. Metric System
2. Microscopy
3. Animal Diversity
4. Plant Diversity
5. Genetic Variation
6. Life in the Sea
7. Fitness and Health
8. Environmental Cause for Concern

Second Year: Biological Systems Theme

1. Basic Unit of Life
2. Structure and Functions of the Heart
3. Structure and Functions of the Lungs
4. Structure and Functions of the Kidneys
5. Bones
6. The Eye and Sight
7. Other Senses
8. Digestion
9. Fertilization and Embryonic Development

Third Year: Genetics and Cell Biology, Ecology, Behavior, and Evolution Theme

1. Cell Organelles
2. Cell Functions
3. Principles of Genetics
4. Genes and Populations
5. Principles of Populations Ecology
6. Community Ecology
7. Types of Behaviors and their Measurement
8. Evolution
9. Evolutionary Forces

The Chemistry modules (developed by Dr. Phoebe Dea, Associate Professor of Chemistry and Dr. John R. Spielman, Professor of Chemistry, CSULA) and the Microbiology modules (developed by Dr. Kenneth Anderson, Associate Professor of Microbiology) similarly began in the first year as motivational, fun-type experiences and increased in sophistication in subsequent years to cover the main topics of current thinking in these disciplines (presented at an appropriate level). Our program was unique in that microbiology/public health was an integral part. This discipline is not taught in the Los Angeles Unified Schools.

The biomedical science modules were augmented by field trips to facilities which illustrated the principles of the discipline under study and showed biomedical professionals in that discipline at work. The students participated in trips to Abbot Laboratories, the City of Hope Research Institute, Union Oil Research Laboratories, Los Angeles County-USC Medical Center, the Los Angeles County Arboretum, the Martin Luther King Jr. Hospital Renal Dialysis Unit, the Edward R. Roybal Community Clinic and many others.

Of particular benefit to the students was the interaction with role models of their own ethnic group. As examples, the Hispanic students responded with surprising (in degree of) enthusiasm to seminars by Dr. Frank Meza, Kaiser Permanente Clinic, on diseases which chronically plague the Hispanic Community, and Dr. Eloy Rodriguez, Department of Biology, University of California, Irvine, on genetic engineering and, on a separate occasion, the scientific traditions of the ancient Mexicans and other pre-Columbian peoples.

A very important component of the science training was the required participation each year in the program's science fair. The students were required to conceive and prepare a significant project. These were then judged by a panel of invited university professors and professionals in the field.

b. Mathematics Proficiency: The Mathematics Tutorials

This was one of the most difficult areas of the program to coordinate since students came with an alarmingly broad range of abilities and backgrounds in mathematics.

Consequently, we learned that the way to make significant progress with each student was to further subdivide the group of 20 into smaller sub-groups. In these ability/background sub-groups, we presented:

1) Traditional math instruction involving problem solving by dimensional analysis, drills, and quizzes with an overall emphasis on the development of deductive reasoning skills;

2) Computer-assisted instruction. CSULA has developed a comprehensive instructional program in mathematics within the Learning Resource Center of the University. The self-paced instructional program provides, in total, instruction fully equivalent to high school courses in algebra I and II, geometry, and trigonometry. Students engaged themselves with only those parts in which they demonstrated weakness.

3) Courses and tutoring in trigonometry, analysis, and pre-calculus for the more advanced students.

4) Instruction in computer programming for the more advanced students.

We attempted to integrate the mathematical requirements of the sciences (biology, chemistry, microbiology) into the mathematics tutorials to underscore the relevance of mathematics to scientific training. A component of the tutorial involved the application of math to the solution of experimentally related science problems. Most students at this level had little prior opportunity to master the technique of dimensional analysis; or, in other words, to use math in solving practical problems in chemistry, biology or microbiology (even in college, most math instructors do not have the background or see the need to provide appropriate examples and problems related to the biomedical sciences). For example, a simple chemical experiment involving the reaction of equal molar quantities of two substances was easily adapted for studying fractions, decimals, and the solving of algebraic equations involving an unknown. The point is that when these math problems are associated with hands-on experiments in the laboratory, the learning can definitely be reinforced and motivational factors play an increasingly more important role. Thus, with good coordination and a concentrated effort on the part of everyone concerned, the target students experienced the relevancy of mathematics from a

biomedical perspective.

The mathematics component, because of its multi-component nature, made a large demand on the resources of the program.

c. English: The Communications Skills Tutorials

It was the aim of the CSULA Biomedical Sciences Program to assist in bringing the student participants to full English language proficiency commensurate with their academic grade level. Toward this aim, we offered a Communication Skills Tutorial. Each group of 20 students participated in these one-hour weekly tutorials during the academic year.

These tutorials were developed by Ms. Agnes Curtis, English teacher at Manual Arts High School. She was particularly effective in motivating students to work. She was assisted by several graduate students in English at CSULA, some of whom were bilingual.

The students participated in a combination of individualized instruction, lectures, group critiques and discussions which familiarized them with the standards of written English and with writing tasks. The students learned to appreciate the various dialects of English spoken by minority groups while improving their writing ability in standard English.

In the weekly meetings, the students received instruction on such basic skills as vocabulary, spelling, sentence structure, punctuation, and paragraphing in a theme context. The students also performed small-group tasks to aid in oral communication. Most importantly, the students had weekly practice in essay writing which was guided by the instructor and closely monitored by two assistants. Students received weekly written feedback and counseling as to their progress in overcoming their particular writing deficiencies.

The communication skills staff did several creative things to enhance the level of student interest in recognition of the importance of proper language and writing. Students wrote stories and articles for the program's newsletter. They held marathon scrabble games to build vocabulary; and vocabulary-building contests, using pre- and post-tests to measure performance.

2. The Summer Programs

a. First Year Summer Program (1981)

All participants were encouraged (though not required) to take part in the summer program. The program consisted of 20 hours per week of activities for six weeks.

As was done in the academic year program, the students were partitioned in groups of 20, each group being a representative mix of races and sexes.

The first summer typical weekly schedule is illustrated below:

SUMMER 1981 TYPICAL SCHEDULE

	M	T	W	Th
8	MATH	ENGLISH	MATH	ENGLISH
9	STUDY SKILLS	SEMINAR	STUDY SKILLS	SCIENCE
10	SCIENCE	SCIENCE	SCIENCE	SCIENCE
11	SCIENCE	SCIENCE	SCIENCE	SCIENCE
12	SCIENCE	SCIENCE	SCIENCE	SCIENCE

b. The Second Summer (1982)

During this summer, we offered a brief course to prepare the students, who had just completed the tenth grade, for the Pre-Scholastic Aptitude Test (PSAT) at their high schools the following Fall. We also offered mathematics and English courses for those individuals who needed more development in these areas.

However, the biomedical science modules were replaced by either (1) volunteer work at a health clinic or hospital, or (2) volunteer work in another biomedically related field. We were able to secure these internships for the students in over 25 biomedically related locations throughout Los Angeles.

c. The Third Summer (1983)

During this summer, we offered a prep course for the Scholastic Aptitude Test (SAT), both verbal and mathematics parts. Beyond this, students participated in internships in (1) biomedical science research laboratories at CSULA; (2) clinical laboratories in the

community; (3) hospitals and clinics; (4) other biomedical research facilities. The progress of the students was monitored by visits from program staff. During the second and third summers, certain students were encouraged to enroll in actual CSULA courses for University credit through its ACE (Accelerated College Enrollment) Program for 11th and 12th graders. The students encouraged to participate were selected based on their performances in the CSULA-Biomedical Sciences Program, performance in their high school programs, and the likelihood for success in basic University course work while still in high school. In the past, very few disadvantaged or minority student have taken advantage of this ACE program.

Students took courses in calculus, biology, psychology and chemistry. The major benefit, besides the knowledge content of these courses, was that the students realized the educational pace and level of sophistication of college courses. Some students were shocked at the required sophistication and commitment, and received C or D grades (where they were used to A's and B's in high school). Happily the ACE program does not penalize high school students for trying: poor grades were not recorded (nor credit given) on the student's transcript.

3. Counseling/Advisement

a. Academic/Career Counseling

Of particular significance is that the students received academic and career counseling from the ninth grade on from program staff.

The program provided yearly "Career Day" events to make the participating students aware of the options available within the biomedical sciences. Presentors (generally positive minority role models) gave overviews of their respective fields, including educational level of special training required, working conditions and monetary reward.

During the last two years, we presented "College Day" events. Overall, some 29 four-year institutions presented their programs, entrance requirements, costs, financial aid plans, etc.

b. The Psychology Component

During the third year, a psychology component was introduced to the Program. This was headed by Elizabeth Putman, M.A., Janet Lewis, M.A., and George Dines, B.A. We felt it not only useful but necessary that the participating students be prepared for the academic, and also the emotional challenges of college (most likely as a minority student in a majority institution). Students participated one hour per week, in groups of ten, in this component.

Until the psychological component was initiated into the program, attention had been focused primarily on academic development. With the addition of the psychologically component, a balance was attained between intellectual and emotional growth.

The premise of the biomedical science program was to initiate career-goal oriented thinking in the students during the significant years prior to college. Self-exploration and evaluation played a central role in the psychological component. Emphasis was on participation and group discussion, exploration of issues and questions, with group exercises and interaction regarding psychological processes involved in group interpersonal relationships. A variety of thought-provoking questions and directives were given to elicit discussion and debate.

Art therapy exercises were given in which the directives initiated group interaction and introspective thought as well as increased awareness of group process through the use of the various art media.

Also important to the program were the guest speakers brought to discuss their experiences in their fields with specific issues related to goal setting, women's/mens' roles in various professions, changing views, coping with stress, setting realistic expectations, teacher/student relationships, employer/employee professionalism, eating habits and proper nutrition as an integral part of strong emotional, intellectual and physical health.

Most important to this component of the program was the emphasis placed on exploration of fears, expectations, values, and previous but often unconscious programming. Exploration centered on what notions we carry with us

that help or hinder our ultimate success in pursuing goals and careers. Resources for further study were provided to interested students.

The psychology component provided an environment in which the students did not feel the constraints of traditional classroom demeanor. This enabled them to freely ventilate, express, and explore feelings of frustration, disappointment, and confusion concerning the system in which they interact.

Due to the nature of the process involved in the psychology component (i.e. revealing oneself to others) a high degree of trust necessarily had to develop between the students and instructors. This trust was achieved by having the same instructors throughout the program, to the extent of utilizing the same substitutes when the primary instructors were absent. A further cementing of trust was made possible as individual counseling became an integral part of the program. As a result, the students were given the opportunity to form bonding relationships with significant adults other than their parent and academic teachers and advisors. The students were encouraged to utilize the psychology instructors as a personal resource for growth and development.

In keeping with the instructors' goal that the students should be exposed to varieties of viewpoints and the widest range of options, professionals from various backgrounds with specialized career training were solicited to speak with the students. It was felt that these professionals provided a view point of the world beyond the confines of the high school and university, which it was felt the students were lacking.

We feel that in the long run, the psychology component may well be one of the most valuable things the students obtained from the program.

c. The College Admission Process

During the Fall 1983 term, the CSULA Biomedical Science Program focused on the process of applying to college for Fall 1984 entry. The process of applying for financial help was also highlighted.

4. Involvement of the parents of the target students in the program.

We recognized the importance of the participation and involvement of parents in as many of the activities in the program as possible. Most of these parents did not go to college and for many of them it was their first introduction to a college campus. Efforts were made to insure that they understood the significance, objectives and overall purpose of the program. Since a large portion of these parents were Hispanic, all printed materials were also prepared in Spanish. One of the program directors is fluent in Spanish and ample bilingual considerations were given.

More specially, parents were involved in the following manner:

1) The advisory board had parental representation.

2) All parents were invited to the orientation program at the beginning of each year. During this orientation, the parents, along with the students, were given tours of the science departments, library, math or computer labs, and met the entire staff including program directors, science professors, teaching assistants and counselors. Parents also played a major role in the awards banquet at year's-end.

3) Each quarter, parents were given schedules and detailed descriptions of all activities for that quarter. Also, they were encouraged to provide help on some activities such as science fair projects.

4) During the last year of the program, parents were asked to play an increasingly more important role. Joint seminars for parents and students were held on college admission procedures, financial aid, career counseling, and other aspects involving the problems and concerns of parents with children entering college.

5. The Termination of the Program

The CSULA-Biomedical Sciences Program lost its funding as a consequence of the shift of project funds from the National level to the States, under the Block Grant Program. The Program ended at CSULA at the end of December 1983. The students were in the middle of their senior year of high school.

III. The Results

The goal of the CSULA Biomedical Sciences Program was to prepare the talented participating students academically and socially so they could gain entry to four-year colleges and universities. Once in college, these trainees would succeed in biomedically related majors. The Program lost its funding two years earlier than expected. The student trainees are, consequently, still in high school (as of 3/84), awaiting notification of acceptance to college/university for Fall 1984 admission. The number who enroll in college, train as biomedical scientists and health professionals, and eventually enter these fields will be the only meaningful test of the success or failure of the Program.

There are, however, indicators that the Program met with certain success. There are also certain indicators which imply we were less than successful.

Retention Rates in the Program

Considering that for almost four years we asked these teenage students to give up their Saturdays and six weeks of their summers, our retention rate was quite good. We began the BSP in 1980 with 100 students. By year two, we had 95. At the start of year three, 85; and 76 at the start of year four. When the program ended in December 1983, the remaining 69 participated in a graduation ceremony.

Thirty-one Hispanics (16 females, 15 males) out of the original group of 40 (21 females, 19 males) completed the three and one-half years of the program.

Retention Rates in High School

All 100 original student participants are still in high school and making progress towards graduation in June 1984. This is significant, considering that the high schools these students attend have high attrition rates, as high as 48% from the tenth to the twelfth grade.

Achievements of the Hispanic Students in their High Schools

Of the 31 Hispanic students who finished the program, six were in the California Scholarship Federation, an honor society; nine were officers in student government, including two student body presidents; three were in the Spanish Honors Society; three were selected as participants in the 1983 statewide Academic Decathalon; four were listed in Who's Who among American High School Students; one was the national secretary of the Honor Society; one was chosen as the Los Angeles area Youth Leader of Tomorrow.

Performance on the Pre Scholastic Aptitude Test (PSAT) and the Scholastic Aptitude Test

Although the Hispanic students who participated in the CSULA Biomedical Sciences Program as a group did much better on these exams (PSAT in the eleventh grade, SAT in the twelfth) than their high school classmates who did not, their scores were still low, relative to the national average for all college bound secondary school students. As their achievements in the previous section show, these students have become part of the academic and political leadership in their high schools. However, the discrepancy between their performance in high school and their performance on national standardized tests indicate to us that 1) there is little demand placed on these students in their high schools to achieve academic excellence at a sufficiently high level; 2) there is little academic competition for these students from their peers in the high school; 3) the CSULA Biomedical Sciences Program was possibly not as effective as it should have been. It is difficult for a once per week enrichment program to entirely compensate for secondary school deficiencies.

To these student's credit, however, it that under very adverse conditions in the schools and in their homes (lack of private space for studying, lack of reference materials, necessity to work part-time for self-support), they performed as well as they did.

The test scores are given below:

PSAT (for College Bound Juniors)

Math	Verbal	Combined
72	40	131
72	59	131
57	56	113
57	54	111
52	59	108
50	57	107
46	59	105
46	59	105
47	52	99
47	52	99
52	46	98
52	46	98
50	46	96
50	46	96
52	42	94
50	42	92
50	40	90

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41	46	87
41	45	86
41	36	77
41	36	77
40	37	77
31	45	76
38	37	75

SAT (for College Bound Seniors)

Math	Verbal	Combined
720	500	1120
650	510	1160
650	510	1160
570	530	1100
530	540	1070
530	460	990
480	460	940
480	460	940
600	340	940
600	340	940
530	340	940
530	350	880
440	420	860
440	420	860
430	430	840
450	390	840
450	390	840
500	340	830
440	390	830
440	390	830
550	250	800
490	290	780

The scores, both in the PSAT and the SAT, are depressed particularly in the verbal portion. We interpreted this as a consequence of the reliance on spoken Spanish by this group, and relative lack of familiarity with written English.

Use of the CSULA Campus by Biomedical Science Program Trainees

The students feel comfortable with the University campus. They are frequently found on campus at non-Biomedical Science program times. They come here to use the library (they have check-out privileges), talk to former program staff about college choices, use the athletic facilities, etc. The point is, they feel they belong on campus. We take this as a real success.

IV. Acknowledgements

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